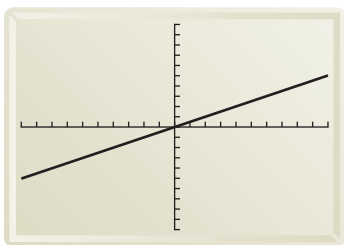


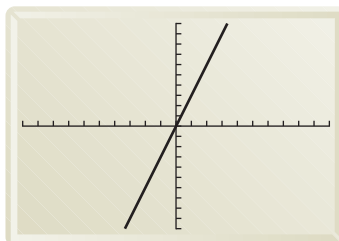
Applications

1. Sean bought a DVD player and a receiver. The store offered him an interest-free payment plan with weekly installments. Sean figured out that after n weeks of payments, he would still owe $175 - 7.5n$ dollars.
 - a. Make a calculator table showing what Sean owes after payments 1, 2, 3, and so on. Study the table to figure out the amount of his weekly payment. How is this amount shown in the table pattern?
 - b. Scan the table to find out how much Sean will owe after 20 weeks. Record the (x, y) table entry that shows the answer.
 - c. When will the amount Sean owes fall below \$100? Which (x, y) table entry shows the answer to this question?
 - d. When will Sean have paid for his items in full? How is this shown in the table?
2. Trevor entered an equation into his graphing calculator, and the calculator displayed this graph and table. The graph is shown in the standard window.



X	Y1	
0	0	
1	.5	
2	1	
3	1.5	
4	2	
5	2.5	
6	3	
X=0		

- a. What is the value of y when $x = 6$? How is this shown in the table? How is it shown in the graph?
 - b. What equation did Trevor enter into his calculator?
3. Ziamara used her calculator to make a graph of $y = 3x$. She noticed that the point $(0, 0)$ was on the graph. Name three other points on the graph. Explain how you found these points.



4. The operators of Ocean Bike Tours consider leasing a small bus. They compare two companies. Superior Buses charges \$5 for each mile driven. East Coast Transport charges \$1,000, plus \$2.50 per mile driven.
- For each company, write an equation to show how the lease cost c depends on number of miles driven m .
 - Enter both equations into your calculator. Choose window settings that make sense for this situation and that show a good view of both graphs. Sketch the graphs, and tell what axes limits (Xmin, Xmax, Ymin, Ymax) you used.
 - Press **TRACE**. Trace your graph to estimate the coordinates of the point at which the lease cost is the same for both companies. Explain what the coordinates of the point tell you about the bus-rental situation.
 - For what driving mileage would the East Coast lease be a better deal? For what mileage would the Superior Buses lease be better? Explain how your answers are shown on the graph from part (b).
5. The Mudville Manatees won the league baseball championship. The manager of the souvenir shop wants to order special shirts and caps to sell to fans. She does market research and predicts these relationships between price in dollars p and number sold n :

$$\text{Shirts: } n = 5,000 - 150p$$

$$\text{Caps: } n = 3,000 - 100p$$

Use these equations to answer the questions below. Making calculator tables and graphs might help.

- What are the projected shirt sales if the price is \$20 per shirt?
- Suppose the manager wants to sell 3,500 shirts. How much should she charge for each shirt?
- What are the projected cap sales if the price is \$17 per cap?
- Suppose the manager wants to sell 1,800 caps. How much should she charge for each cap?



6. The principal of Lincoln Middle School wants to send her top science students on a field trip to the state science center. The trip costs \$250 for a bus and driver, plus \$17.50 per student for food and admission.
- What equation relates the trip cost c to the number of students who go on the trip n ?
 - What is the cost of sending 30 students? What is the cost for 60 students?
 - How many students can go if the budget allows a maximum cost of \$1,000?

Connections

For Exercises 7–10, use the pattern to find the missing entries. Then, write an equation relating the two variables.

7.

a	0	1	2	3	■	8	20	100
b	0	7	14	21	28	■	■	■

8.

x	0	1	2	3	4	8	20	100
y	6	7	8	9	■	■	■	■

9.

m	0	1	2	3	4	8	20	100
n	1	3	5	7	■	■	■	■

10.

r	0	1	2	3	4	6	10	20
s	0	1	4	9	16	■	■	■

11. José used his graphing calculator to find the whole-number factors of 960. Here are the steps he followed:

Step 1: Enter the equation $y = 960 \div x$.

Step 2: Set TblStart = 1 and $\Delta\text{Tbl} = 1$.

Step 3: Scan the table, looking for whole numbers in the y column.

- Use José's strategy. Make a list of the factor pairs for 960.
- Explain why José's strategy works for 960. How could you modify his strategy to find factors of a different whole number?
- What is the greatest x -value you need to check to guarantee you have found all the factors of 960? Explain.

- 12.** Most states add sales tax to the cost of non-food items. Let p stand for the list price of an item, t for the additional amount you must pay due to the sales tax, and c for the total cost of buying the item.
- What equation relates c , p , and t ?
 - Suppose a state has a sales tax of 8%. What equation relates t and p ? What equation relates c and p ?
 - Enter the equations from part (b) in your calculator. Make a calculator table showing list price, tax, and total cost for items priced from \$0 to \$100 in steps of \$5.
 - What is the total cost of a non-food item that is priced \$65?
- 13.** You have seen that many of the costs for the Ocean Bike Tour depend on the number of customers. This table shows a new relationship between the number of customers and the cost of a ferry ride.

Costs for Ferry Ride

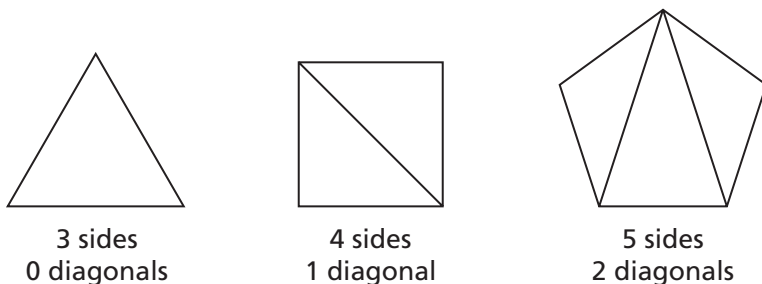
Customers	1	2	3	4	5	6	7	8	9
Ferry Cost	\$2.50	\$5.00	\$7.50	\$10.00	\$12.50	\$15.00	\$17.50	\$20.00	\$22.50

- Write an equation for the rule relating ferry cost f and number of customers n .
- Use your equation to find the cost if 35 people are on the tour.
- How many people can go on the ferry if the tour leader has \$75?



- 14.** Look back at Exercise 12 in Investigation 1. The first graph shown is the relationship between Amanda's hunger and the time of day. Could you represent this relationship in a table? Could you represent this relationship with an equation? Explain.

- 15.** You know from your work with polygons that one way to find the sum of the interior angles of a polygon is to divide the shape into triangles by drawing diagonals from one of the vertices, as shown below.



- a.** Copy and complete the table below. The last row should contain formulas for D , S , and A for a regular polygon with n sides. (Remember that a *regular polygon* is a polygon in which all sides are the same length and all angles are the same size.)

Regular Polygons

Number of Sides, n	Number of Diagonals, D (from a single vertex)	Sum of Interior Angles, S	Size of Each Angle if Polygon is Regular, A
3	0	180°	60°
4	■	■	■
5	■	■	■
6	■	■	■
\vdots	\vdots	\vdots	\vdots
n	$D = \text{■}$	$S = \text{■}$	$A = \text{■}$

- b.** Enter your formula for D into your calculator. Use a table or graph to find the number of sides a polygon must have if you can draw exactly 10 diagonals from a single vertex.
- c.** Enter your formula for S into your calculator. Use a table or graph to find the sum of the angles for a polygon with 10 sides.
- d.** Enter your formula for A into your calculator. Using a table or graph, look at the A values for polygons with up to 20 sides. Identify (by giving the number of sides) all regular polygons that have whole number interior angle measures.

- 16.** The area, A , of a circle is related to the radius, r , by the equation $A = \pi r^2$. Enter this formula into your calculator. Use a calculator graph or table to estimate the answers to the questions below. Make your estimates correct to the nearest tenth.
- What is the radius of a circle that has area 144 square inches (1 square foot)?
 - What is the radius of a circle that has area 9 square feet (1 square yard)?

Extensions

- 17.** In this unit, you have studied a variety of relationships between variables. The equations below are simple cases of three important types of patterns of change.

$$y_1 = 2x$$

$$y_2 = x^2$$

$$y_3 = \frac{3}{x}$$

- For each equation, make a table of (x, y) values for $x = 0, 1, 2, 3$, and so on. Describe the pattern of change in each table by completing this sentence:

As the value of x increases, the value of y _____.

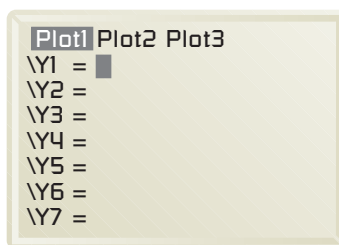
Be as precise as you can in describing the patterns. Then, compare each individual pattern of change with the others.

- Graph the three equations in the same viewing window, with $X_{\min} = 0$, $X_{\max} = 5$, $Y_{\min} = 0$, and $Y_{\max} = 15$. Describe the patterns of change shown by the graphs. Explain how each pattern can be predicted by thinking about the calculations required to find y from x .

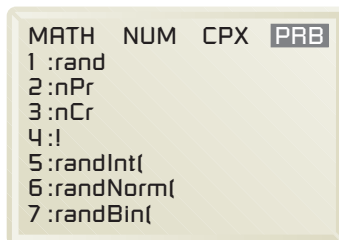


18. You can use your graphing calculator to simulate probability experiments that involve rolling dice or flipping coins.

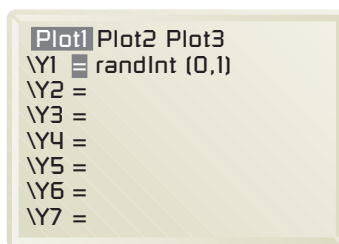
a. Press **Y=**.



Then, press **MATH**, highlight PRB on the top of the screen, and press 5 to select “randInt(.”



You will be back to the Y= screen. Complete the equation by typing 0 **▢** 1 **)**.



The equation $y = \text{randInt}(0, 1)$ randomly gives a y -value of either 0 or 1, no matter what the x -value is. Consider 0 to mean “heads” and 1 to mean “tails.”

Press **2nd** **TblSet** and specify $\text{TblStart} = 1$ and $\Delta\text{Tb} = 1$. Then press **2nd** **TABLE**. The X column counts the coin tosses, and the Y1 column tells you whether the result is heads (0) or tails (1).

Copy and complete the table below.

Graphing Calculator Coin Tossing

Number of Tosses	5	10	20	30	40	50
Number of Heads	▢	▢	▢	▢	▢	▢
Fraction of Heads	▢	▢	▢	▢	▢	▢
Fraction of Tails	▢	▢	▢	▢	▢	▢

Describe patterns in the results. Are the results what you would expect? Explain.

- b.** Revise the procedures of part (a) to simulate rolling a fair die 50 times. Calculate the number of times and fraction of times the outcome 1 occurs in the 50 rolls. Are the results what you would expect? Explain. (**Hint:** The equation $y = \text{randInt}(3, 5)$ randomly gives a y -value of 3, 4, or 5. The equation $y = \text{randInt}(13, 17)$ randomly gives a y -value of 13, 14, 15, 16, or 17. What equation would give random dice rolls?)
- 19.** The bike tour holds a 30-mile race on the last day. They give the two youngest riders, Tony and Sarah, a half-hour head start. For this first half hour, Tony and Sarah ride at a steady pace of 12 miles per hour. Then, they keep up a steady pace of about 10 miles per hour. When the others start riding, they go at a steady pace of about 15 miles per hour.
- Write an equation for the distance d in miles Tony and Sarah travel in t hours.
 - Write an equation for the distance d in miles the other riders travel in t hours.
 - Use the equations from parts (a) and (b) to make a table and a graph showing the relationship between distance and time for the two groups of riders.
 - Will the older riders catch up with Tony and Sarah before the end of the 30-mile race? Explain using both the table and the graph.

